

PATENT ABSTRACTS OF JAPAN

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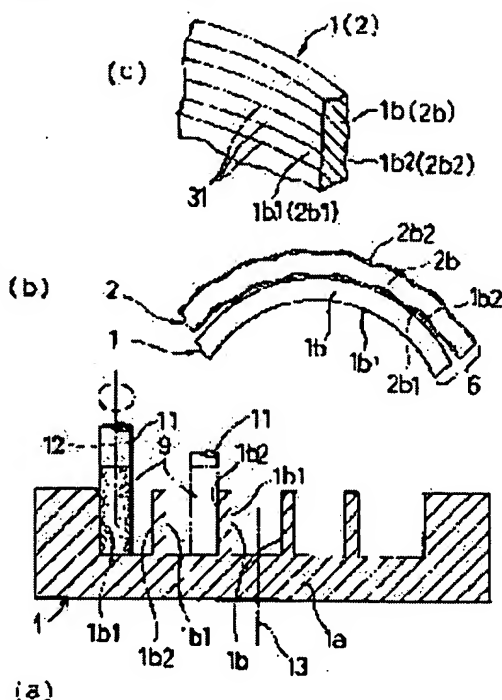
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(54) SCROLL COMPRESSOR, AND SCROLL LAP MACHINING METHOD THEREOF

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a scroll compressor of high precision, high efficiency, and low noise by grinding a side surface of a scroll lap for reducing undulation in the circumferential direction.

SOLUTION: Side surfaces 1b1, 1b2 of a scroll lap 1 are ground by a grinding wheel 9, so leak of compression gas between mutually sliding side surfaces of each lap of a fixed scroll and a rotary scroll can be prevented, thereby compression efficiency is improved.



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CLAIMS

[Claim(s)]

[Claim 1] The scrolling compressor carry out that one of side faces is [slide / on each other / in each of said lap] grinding-process sides at least as the description in the scrolling compressor engage the laps of the letter of scrolling which start from each end plate of fixed scrolling and turning scrolling , form compression space mutually , reduce the volume , go , move to the center section which leads to a delivery from the periphery side on which compression space leads to inhalation opening by circular orbit motion of turning scrolling , and carry out inhalation of a fluid , compression , and the regurgitation .

[Claim 2] Engage the laps of the letter of scrolling which start from each end plate of fixed scrolling and turning scrolling, and compression space is formed mutually. In the scrolling compressor which reduces the volume, goes and performs inhalation of a fluid, compression, and the regurgitation while moving to the center section which leads to a delivery from the periphery side on which compression space leads to inhalation opening by circular orbit motion of turning scrolling The scrolling compressor characterized by having the processing marks with one of side faces parallel to an end plate on which said each lap slides mutually at least.

[Claim 3] Engage the laps of the letter of scrolling which start from each end plate of fixed scrolling and turning scrolling, and compression space is formed mutually. In the scrolling compressor which reduces the volume, goes and performs inhalation of a fluid, compression, and the regurgitation while moving to the center section which leads to a delivery from the periphery side on which compression space leads to inhalation opening by circular orbit motion of turning scrolling The scrolling compressor characterized by having the processing marks with one of side faces parallel to an end plate in respect of grinding on which said each lap slides mutually at least.

[Claim 4] Engage the laps of the letter of scrolling which start from each end plate of fixed scrolling and turning scrolling, and compression space is formed mutually. In the scrolling compressor which reduces the volume, goes and performs inhalation of a fluid, compression, and the regurgitation while moving to the center section which leads to a delivery from the periphery side on which compression space leads to inhalation opening by circular orbit motion of turning scrolling The configuration of the as right-angled direction whose side face of one of scrolling laps is a grinding process side at least as an end plate where said each lap slides on each other is a scrolling compressor characterized by being the configuration by which the configuration of the grinding stone which carried out the grinding process was imprinted.

[Claim 5] A scrolling compressor given in any 1 term of claims 1-4 whose surface roughness of a scrolling lap is 1 micrometer or less.

[Claim 6] it be the scrolling compressor carry out that the corner section between the side face of each of said lap and said end plate side be a curved surface as the description in the scrolling compressor which engage the laps of the letter of scrolling which start from each end plate of fixed scrolling and turning scrolling , form compression space mutually , reduce the volume , go , move to the center section which lead to a delivery from the periphery side on which compression space lead to inhalation opening by circular orbit motion of turning scrolling , and perform in inhalation of a fluid , compression , and the regurgitation .

[Claim 7] Said curved surface is a scrolling compressor according to claim 6 with which the grinding stone configuration of the outer-corner section in the head of the grinding stone which carried out the grinding process of the side face of a lap is imprinted.

[Claim 8] Fixed scrolling and turning scrolling are a scrolling compressor given in any 1 term of claims 1-7 held in the well-closed container with the motor which drives turning scrolling.

[Claim 9] The processing approach of the scrolling lap characterized by the thing whose lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides on each other, and which is done for the grinding process of one of the side faces with a grinding stone with a larger

linear dimension than the standup height from the end plate of a lap at least.

[Claim 10] The processing approach of the scrolling lap carried out [finish-machining by carrying out a grinding process with a grinding stone with the same chucking condition as the time of processing by the end mill of fixed scrolling or turning scrolling, after / on which the lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides mutually / carrying out cutting of one of side faces and end plates with an end mill at least, and] as the description.

[Claim 11] The processing approach of the scrolling lap characterized by the thing whose lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides on each other, and for which the grinding process of one of side faces and end plates is carried out simultaneously, and they are finished with one grinding stone at least.

[Claim 12] The processing approach of the scrolling lap characterized by the thing whose lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides on each other, and for which the grinding process of one of side faces and the end plate is independently carried out with the grinding stone according to individual, and they are finished at least.

[Claim 13] The processing approach of the scrolling lap characterized by the thing of the lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling a grinding stone performs [a thing] a grinding process for the both sides of one of medial surfaces, and the lateral surface one by one in order of the lateral surface from a medial surface, or the lateral surface to a medial surface at least.

[Claim 14] The processing approach of the scrolling lap which carries out [tool / revolution] as the description toward a travelling direction in few things which include-angle anteversion is carried out and are processed to an end plate for deleting by the revolution tool on which the lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides mutually, and to which one of side faces and end plates are moved along with the longitudinal direction of a lap at least, and processing it.

[Claim 15] The processing approach of the scrolling lap characterized by setting the finishing stock when finish-machining with the grinding stone of one of side faces at least at which the lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides mutually or less [of the particle size which the abrasive grain of the grinding stone used for this finish-machining has] to 1/10, and finish-machining it.

[Claim 16] The processing approach of the scrolling lap characterized by setting the rotational frequency of a revolution grinding tool as 30,000 or more revolutions per for 1 minute, and processing it in finish-machining on which the lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides mutually according to the revolution grinding tool of one of side faces at least.

[Claim 17] The processing approach of the scrolling lap characterized by to let the processing coolant flow to the center of rotation of a revolution grinding tool, to make it spout from the head center section of the revolution grinding tool in finish-machining on which the lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling slides mutually according to the revolution grinding tool of one of side faces at least, and to process it.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the scrolling compressor used for refrigeration, an air conditioner, etc., and the processing approach of scrolling.

[0002]

[Description of the Prior Art] As this kind of compressor is shown mainly in drawing 16 and drawing 17, the lap a of the letter of scrolling The fixed scrolling c from which b started at the right angle from end plates c1 and d1 mostly, and the turning scrolling d Those laps a b -- it carries out what, it engages and compression space e is formed mutually, moving to the center section which leads to Delivery g from the periphery side on which compression space e leads to the inhalation opening f by circular orbit motion of the turning scrolling d, the volume is reduced, it goes and inhalation of a fluid, compression, and the regurgitation are performed.

[0003] In the scrolling compressor of air-conditioning equipment, the thing of closed mold which held the scrolling compressor in the well-closed container which is not illustrated with the motor which drives the turning scrolling d is also used about what was maintenance-free-ized in consideration of lubricity etc. thus, MMETENANSU -- about ten years need to be functional guaranteed especially of a free scrolling compressor.

[0004] By the way, after such fixed scrolling and turning scrolling carrying out casting etc. with an iron system or an aluminum system metallic material and forming them conventionally, they finish-machine the side face on which each lap slides mutually in cutting by the end mill h with the end cutting edge of 2-10 sheets, and it is made to have the required engine performance secured.

[0005]

[Problem(s) to be Solved by the Invention] However, the precision of the lap side attachment wall in cut finish-machining by the end mill of the above-mentioned conventional lap is difficult to be stabilized, and to secure and manage a good precision not only depending on the process tolerance of an end mill but depending on the deflection and processing conditions by the installation error of an end mill, and is coarse. [of surface roughness] It is necessary to raise the precision of a side face to prevent [after fixed scrolling and turning scrolling have bit and been put together, make the clearance between side faces small, and] the leakage of compressed gas.

[0006] Moreover, since it is large in surface roughness since it is that to which cutting also of the end plate is carried out by the end mill with side-face processing of a lap, and **** of the head configuration of the crest in surface roughness is sharp, sliding loss and the leakage loss of compressed gas occur, and there is a problem of the effectiveness of a compressor not being enough still and being easy to get worse with time.

[0007] Furthermore, the rotational frequency of an end mill cannot but make [many] the feed per revolution per one revolution to it being common to be 20,000 or less revolutions and to process it, considering the field of processing efficiency, in order to suppress wear of the edge of a blade. The problem that where of it is generated in the pitch which the periodic processing unevenness by the part with the end cutting edge of an end mill and the part which is not cut, and is proportional to the little of the number of cutting edges when done in this way, also produce the periodic deflection by the installation error of an end mill, and these become the cause which the wave of a longitudinal direction generates on the side face of a lap, a very small oscillation occurs in turning scrolling, and the noise becomes high during scrolling compressor operation is.

[0008] Moreover, since the space formed in the meantime since it is necessary to take large beveling of the inside and outside corner section of the partner lap up end face which bit and was put together in order for the corner configuration of the boundary section of a lap side face and an end plate side to change with wear of the head outer corner section of an end mill also becomes large, therefore leakage of compressed gas increases, the technical problem

that the effectiveness of a scrolling compressor gets worse occurs.

[0009] The object of this invention is to solve the above-mentioned conventional technical problem, and is to offer the processing approach of the scrolling lap used for a scrolling compressor and this with the high letter lap of scrolling of process tolerance.

[0010]

[Means for Solving the Problem] In order to attain the above-mentioned object, the typical scrolling compressor of this invention Engage the laps of the letter of scrolling which start from each end plate of fixed scrolling and turning scrolling, and compression space is formed mutually. In what reduces the volume, goes and performs inhalation of a fluid, compression, and the regurgitation while moving to the center section which leads to a delivery from the periphery side on which compression space leads to inhalation opening by circular orbit motion of turning scrolling It is characterized by finishing the side face of the lap of the letter of scrolling on which said each lap slides mutually in which one of side faces is grinding process sides at least, by the grinding process. Since the familiarity nature to the front face of a work is good even if there are not a place with a cutting edge like [in the case of an end mill] and uniform periodic processing unevenness and there is an inclination of an installation precision top some Even if the wave of the longitudinal direction by the grinding process is not made on the side face of a lap or it can do, it is small, and since the front face by grinding is fine, it can prevent that compressed gas is revealed between the side faces on which each lap of fixed scrolling and turning scrolling slides mutually, and its compression efficiency improves. And since circular orbit motion is performed without turning scrolling carrying out a very small oscillation during operation according to the wave of the hoop direction of a lap side face being small, and a front face being smooth, an operation sound can realize a quieter scrolling compressor compared with the former.

[0011] As the processing approach of the typical scrolling lap of this invention The lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling, It is characterized by the thing which slide on each other and which is done for the grinding process of one of the side faces with the grinding stone of die length with a larger dimension than the standup height from the end plate of a lap at least. Since the time and effort and time amount which perform processing in several steps since it can attach throughout the standup height of the side face of a lap, the longitudinal direction can be covered and the grinding process can be carried out at once are not needed, working capacity is good, product cost decreases, and there is an advantage which is easy to secure process tolerance.

[0012] The object and the description beyond it of this invention become clear by the following detailed explanation and the publication of a drawing. Each description of this invention is independent [its], or can be compounded and used in various combination in the possible range.

[0013]

[Embodiment of the Invention] It explains to a detail about the processing approach of the scrolling compressor applied to the gestalt of this operation of this invention below, and a scrolling lap, referring to drawing 1 - drawing 15 with those examples, and an understanding of this invention is presented.

[0014] The gestalt of this operation as drawing 1 and drawing 15 show one example Lap 1b of the letter of scrolling which starts from each end plates 1a and 2a of the fixed scrolling 1 and the turning scrolling 2, 2bs are engaged and compression space 3 is formed mutually, and moving to the center section which leads to a delivery 5 from the periphery side on which compression space 3 leads to the inhalation opening 4 by circular orbit motion of the turning scrolling 2, the volume is reduced and it goes. Inhalation of a fluid, It is the scrolling compressor 6 which performs compression and the regurgitation, and is an example at the time of considering as the maintenance free thing for air conditioning held with the motor 8 which drives the turning scrolling 2 in the well-closed container 7 shown in drawing 15 . Therefore, the fluid which performs inhalation, compression, and the regurgitation is a refrigerant. However, if this invention engages fixed scrolling and turning scrolling with the lap of the letter of scrolling, and forms compression space and circular orbit motion of turning scrolling performs inhalation of a fluid, compression, and the regurgitation, without being restricted to this, it is effective, and especially the class of fluid to deal with is not asked, either.

[0015] Stator 8a of a motor 8 is fixed to the inner circumference of a well-closed container 7, and the scrolling compressor 6 shown in drawing 15 is being fixed to the crankshaft 16 with which rotator 8b of the motor 8 corresponding to this drives the turning scrolling 2. Bearing of the crankshaft 16 is carried out so that it can rotate by the main bearing member 18 and the countershaft receiving part material 20 which were fixed to the inner circumference of a well-closed container 7. The thing of one-point support by things, such as a type, may be used for a type different every length every [which this example shows] width. The lower part of a well-closed container 7 serves as the lubrication sump 17.

[0016] The Oldham splice 19 to which the fixed scrolling 1 of the scrolling compressor 6 carries out a bolt stop etc., is

attached in the main bearing member 18, prevents rotation of the turning scrolling 2 between the turning scrolling 2 and the main bearing members 18 which gear with this fixed scrolling 1, and a circular movement, i.e., circular orbit motion, is carried out is formed. The fixed pivot 25 prepared in the tooth back of the turning scrolling 2 for turning actuation is inserted in the eccentric bearing 26 of a way among journal shaft 16a formed in the end of a crankshaft 16, and circular orbit motion of the turning scrolling 2 is carried out through the eccentric bearing 26 and a fixed pivot 25 according to the revolution of journal shaft 16a in case a crankshaft 16 rotates. The oiling device 27 is formed in the edge of a crankshaft 16 at the countershaft receiving part material 20, and the oil suction-tube 27a is absorbed in the lubrication sump 17.

[0017] On the other hand, the conveyance-of-oil way 28 is formed in the crankshaft 16, and the lubricating oil of the lubrication sump 17 is absorbed from oil suction-tube 27a by actuation by the crankshaft 16 of the oiling device 27, after it carries out the lubrication of each sliding section of the scrolling compressor 6 through the conveyance-of-oil way 28, it is discharged in a well-closed container 7, and it returns to oil suction-tube 27a through the clearance between a motor 8 and a well-closed container 7. Moreover, the refrigerant which the scrolling compressor 6 inhaled from the suction pipe 29 is breathed out out of a well-closed container 7 through the discharge tube 30 which compressed by compression space 3 and was formed in the well-closed container 7 through the delivery 5.

[0018] The side face one b1 on which each lap 1b and 2b slide mutually, and 2b2 at least especially the scrolling compressor 6 of the gestalt of this operation on the other hand And it is used at least as a grinding process side of a side face one b2 and 2b1 where the grinding process of the side face one b1 of lap 1b of the fixed scrolling 1 and one b2 was carried out to (a) of drawing 2, and drawing 3 on the other hand with the grinding stone 9 shown as one example. Therefore, if grinding process finishing is carried out, it will be sufficient and especially the processing process before it will not be asked. After carrying out cutting of what carried out casting etc. with metallic materials, such as iron and aluminum, and gave the basic configuration, a grinding process may be carried out with a grinding stone 9 etc., you may finish, and cutting can also be omitted.

[0019] Thus, if the side face one b1 on which lap 1b of the letter of scrolling and 2b slide mutually, and 2b2 reach on the other hand at least and at least one side of one b2 and 2b1 finishes by the grinding process As it represents with the side face one b1 of lap 1b of the fixed scrolling 1, and one b2 in (b) of drawing 2 and is shown in it or there is no wave of a longitudinal direction -- being certain -- even if -- a wave which is a case [not carrying out grinding process finishing but having processed / which represents with side-face 2b1 of the turning scrolling 2, and 2b2, and is shown / it into (b) of drawing 2 with the end mill] -- comparing -- **** -- it is small. In the grinding process by the end mill, even if this does not have a place with a cutting edge, and uniform periodic processing unevenness and has the inclination of an installation precision top some, since the familiarity nature to the front face of a work is good, it is because the wave of the longitudinal direction by the grinding process is not made on the side face which carried out the grinding process. Since the front face by grinding is fine, moreover, between between the side face one b1 on which each lap 1b of the fixed scrolling 1 and the turning scrolling 2 and 2b slide mutually, and 2b2 and a side face one b2, and 2b1 If the grinding process of each one side is carried out, as shown in (b) of drawing 2, since the clearance which it starts and compressed gas reveals throughout the sliding section of a direction is not generated, both lap 1b and 2bs can prevent leakage of such compressed gas, and its compression efficiency will improve. And there is no wave of the hoop direction of the side face as for which lap 1b and 2b carried out the grinding process, or it is small, and since circular orbit motion is performed without turning scrolling carrying out a very small oscillation during operation according to a front face being smooth, an operation sound can realize a quieter scrolling compressor compared with the former. Moreover, wear is also reduced. As opposed to the surface roughness in the case of being based on end mill processing, as shown in (b) of drawing 4 being 2 micrometers The surface roughness at the time of carrying out grinding process finishing, as shown in (a) of drawing 4 is halved with 1 micrometer. Rather than the crest 21 of the surface roughness in the case of being based on end mill processing, it is small, and the possibility of the wear on the basis of the local dissolution by generation of heat which takes place by contact of crests is almost canceled, the direction of the crest 22 of the surface roughness in the case of being based on a grinding process sharpens, and abrasion resistance of whenever improves [a sliding friction is small and]. According to similarly it being shallower than trough 21a in case trough 22a of surface roughness is end mill processing, since leakage of compressed gas can be suppressed more, a reliable scrolling compressor can be offered.

[0020] Therefore, it is convenient although the functional guarantee over the long period of time of ten years in the scrolling compressor of the closed mold shown in maintenance free drawing 15 is offered. It is more suitable for the improvement in the engine performance by the above grinding processes to make into a grinding process side the both sides of the both sides of the side face one b1 on which it slides mutually, and 2b2 and a side face one b2, and 2b1.

[0021] As the grinding process approach of such lap 1b of the letter of scrolling, and 2b It uses as a revolution grinding

tool by carrying out chucking of the grinding stone 9 at the head of the processing shaft 11 by which a revolution and migration are controlled as one example is shown in drawing 2. With the position in which the axis of rotation 12 of a grinding stone 9 becomes in parallel with the medial-axis line 13 of the fixed scrolling 1 or the turning scrolling 2. What is necessary is just to process grinding by the grinding stone 9, when reliance makes it move to the side face one b1 set as the grinding process object of lap 1b and 2b along with longitudinal directions, such as lap 1b, without moving from its seat as shown in drawing 1. However, the concrete approach of whether what we do with a grinding process can be chosen freely. However, it is suitable to hold down to 1 micrometer or less, when harnessing the advantage by the above grinding processes as surface roughness by the grinding process.

[0022] Moreover, in (a) of drawing 2, and drawing 3, in case the grinding process of the side face one b1 of lap 1b of the fixed scrolling 1, one b2, etc. is carried out, it is suitable to be 30,000 or more revolutions per for 1 minute, and to process the rotational frequency of a grinding stone 9. Thereby, although the amounts of processings per revolution are few, since the rotational frequency is high, the amount of processings per unit time amount can secure the conventional end mill and more than equivalent. Furthermore, since the amount of processings per revolution of a grinding stone 9 can be small stopped compared with an end mill, the wave of the grinding side face one b1 generated by the deflection of the grinding stone 9 as a revolution grinding tool and the lap longitudinal direction of one b2 can be made small, the minute oscillation of the turning scrolling 2 under operation is controlled, and the scrolling compressor of the low noise can be realized.

[0023] Like the example shown at (a) of drawing 2, and drawing 3 although a grinding process is carried out, as a grinding stone 9 If a thing with bigger linear dimension L than standup height H of lap 1b which carries out the grinding process of the side face, and 2b is adopted, since reliance will obtain a grinding stone 9 at once in all the range of standup height H of lap 1b and 2b. The rest can finish-machine at once the scrolling configuration of the side face set as the object of a grinding process, if moved to the longitudinal direction of lap 1b which carries out a grinding process, and 2b. Therefore, time and effort and adjustment which divide into multiple times and perform a grinding process become unnecessary, although process tolerance is high, compaction of floor to floor time is achieved, and the cheap scrolling compressor of cost can be offered.

[0024] Moreover, on the occasion of such processing, a grinding stone 9 [that finish-machining actuation in which it does not move in the direction of axis of rotation 12 is performed, etc. and] Microscopic irregularity as shown in (c) of drawing 2 which right-angled lap 1b and 2b start to end plates 1a and 2a, and is made in a direction. The longitudinal direction of lap 1b which met in the direction of relative displacement with side faces, such as lap 1b by which the grinding process was carried out by this to the grinding stone 9, and 2b, and 2b is followed. The processing marks 31 will be formed. The processing marks 31 of such a direction Lap 1b, The wave of the lap longitudinal direction in the side face as for which 2b carried out the grinding process can be stopped very small. It can circle that is, circular orbit exercise, without also causing a minute oscillation between the fixed scrolling 1, and the turning scrolling 2 can offer the scrolling compressor of the low noise more.

[0025] In many cases, such processing marks 31 are obtained as what the configuration of the direction of the axis of rotation 12 in the side peripheral surface of a grinding stone 9 imprinted, but if configuration attachment by the dressing of the side peripheral surface of a grinding stone 9 is performed, the processing marks 31 can be formed in a satisfactory configuration. Although a grinding process side is not asked about the processing method of a substrate in order to enable it to fully demonstrate the description by such grinding process, it is necessary to set up the finishing stock only by the grinding process in which the effect of the condition of a substrate side does not remain. Moreover, although it is suitable for the set-up finishing stock that it is satisfied with one grinding process as mentioned above, it is desirable to set grinding finishing-stock S or less to 1/10 to the particle size of the abrasive grain 91 of a grinding stone 9 as one example is typically shown in drawing 5. Thus, even when are set up and an abrasive grain 91 is fixed to a base material 92 with adhesives 93 as shown in drawing 5, the chip pocket 32 of scraps blowdown can fully secure, scraps can discharge smoothly, the burden concerning a grinding stone 9 is mitigated and a life becomes long that it is easy to prevent omission of an abrasive grain 91. The cost of a scrolling compressor reduces only the part.

[0026] Moreover, the example typically shown in drawing 6 is an example of a scrolling compressor, and is an example at the time of processing it so that the side face one b1 of the fixed scrolling 1 as for which is [the side face] periodical or carries out configuration management with a dressing as occasion demands etc., and it carries out a grinding process, one b2, etc. may start and the side periphery configuration of a grinding stone 9 may be imprinted as a configuration of the right-angled sense to direction, i.e., end plate, 1a. If it does in this way, by configuration management of a grinding stone 9, to end plate 1a of side faces, such as lap 1b of the fixed scrolling 1 which carries out a grinding process, it can be right-angled, that is, the configuration of the direction of the medial-axis line 13 can be managed. By this, it is stabilized easily, the optimal configuration in the condition that heat and a pressure were added can be formed at the

time of operation, leakage of the compressed gas under operation can decrease, and the high scrolling compressor of effectiveness can be offered.

[0027] But cutting other than the grinding process according [the above processing marks 31] to a grinding stone 9 is also attained, and the effectiveness which can make small the wave of the longitudinal direction of lap 1b and 2b according to the condition of the processing marks 31 is demonstrated irrespective of the difference in the processing approach.

[0028] The example shown in drawing 7 is an example of the processing approach, and shows the example used as the scrolling compressor 6 which formed corner section 1c of the side face one b1 of lap 1b of the fixed scrolling 1, and the boundary section of one b2 and end plate 1a on the curved surface. The inside-and-outside corner aspect picking section 33 at the head of lap 2b [in / by this / the turning scrolling 2], Since the space 34 formed by corner section 1c of the fixed scrolling 1 can be compared with the space 36 formed between corner section 2c of the turning scrolling 2 which is not a curved surface, and the inside-and-outside chamfer 35 at the head of lap 1b in the fixed scrolling 1 and can be made small several [1/] Leakage of compressed gas can realize the high scrolling compressor of little effectiveness. In addition, although this example represented and explained by the fixed scrolling 1, the turning scrolling 2 is suitable similarly.

[0029] The example shown in drawing 8 is an example of the processing approach, and forms corner section 1c in a curved surface by the imprint of the configuration of corner section 9a in a grinding stone 9 by forming outer-corner section 9a at the head of a grinding stone 9 in a curved surface, and processing the side face one b1 of lap 1b in the fixed scrolling 1, and one b2 into the field and coincidence of end plate 1a. This as well as the turning scrolling 2 is applicable. The configuration when making corner section 1c and 2c of the fixed scrolling 1 or the turning scrolling 2 into a curved surface by this by managing the curved-surface configuration in corner section 9a at the head of a grinding stone 9 with a dressing etc. is manageable. Here, compared with the direct configuration management in corner section 1c and 2c of the fixed scrolling 1 or the turning scrolling 2, since it is easy also on a facility, whenever it processes management of the curved-surface configuration of corner section 9a in grinding stone 9 head, it can be checked, and it can supply the high components of quality. This is very important when maintaining small the space 34 and 36 formed between the corner sections 1c and 2c in the fixed scrolling 1 or the turning scrolling 2, and the chamfers 33 and 35 at the head of partner lap 1b or 2b, and it can realize the high scrolling compressor of effectiveness easily.

[0030] The fixed scrolling 1 which the example shown in drawing 9 is an example of the processing approach, and serves as a grinding object with chucking equipment 41 On the chucking table 42, carry out chucking by the chucking member 43, fix from two places, the surroundings, at least, and cutting only of the cut cost is carried out with an end mill 44 in this condition. After considering as a uniform predetermined cutting side from the condition of the substrate by casting etc., the grinding process by the grinding stone 9 is performed with the chucking condition at the time of processing by the end mill 44, without removing from said chucking equipment 41.

[0031] Since the remainder of the processing side 45 can be lost before being the substrate which carried out cutting with the end mill 44, even if it makes it by this small to about [in the grinding process by the grinding stone 9] finishing-stock S0.01mm, the high components of quality can be obtained. Since especially lap 1b has usually adopted complicated configurations, such as an involute, in many cases, once it separates from chucking equipment 41 before a finish-machining process, a main gap and an include-angle gap will arise, if finishing-stock S is made smaller than about 0.05mm, the front processing side 45 will remain and it will become poor quality. Moreover, since a grinding process is carried out without removing from chucking equipment 41, since finishing-stock S becomes homogeneity and the load to a grinding stone 9 is stabilized, process tolerance is stabilized, and since it is minute, the load to a grinding stone 9 becomes small, and finishing-stock S can lengthen the life of a grinding stone 9. Therefore, it is quality and the product of low cost can be supplied. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0032] The example shown in drawing 10 is an example of the processing approach, with the grinding stone 9, is carrying out the grinding process of the field of the side face one b1 of lap 1b in the fixed scrolling 1, one b2, and end plate 1a simultaneously, and is finish-machining it. Thereby, since corner section 1c made to the side face one b1 of lap 1b and the boundary section between one b2 and end plate 1a is formed in a minute curved surface, it can raise the reinforcement of lap 1b. Therefore, a reliable scrolling compressor can be offered. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0033] The example shown in drawing 11 is an example of the processing approach, and as a continuous line and an imaginary line show, it is carrying out grinding finish-machining of the side face one b1 of lap 1b and the field one a1 of one b2 and end plate 1a in the fixed scrolling 1 at the separate process with the same grinding stone 9. Thereby,

since the processing side of a grinding stone 9 is divided into two processing sides which process it into different ** of side peripheral surface 9b for lap 1b, and near apical surface 9c of end plate 1a, though it is processing of the 2nd page by one grinding stone 9, reinforcement of a grinding stone 9 can be attained that generation of heat at the time of processing is hard to be accumulated. Of course, even if it processes it independently with each exclusive grinding stone the object for processing of lap 1b, and for processing of end plate 1a, there is same effectiveness. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0034] The example shown in drawing 12 is an example of the processing approach, and although grinding process finishing of the lap 1b in the fixed scrolling 1 is carried out, as a continuous line showed first, it processed it in advance per inside side face one b1, and as an imaginary line shows after that, it is processed into it with the same grinding stone 9 per outside side face one b2. Since the respectively optimal scrolling configuration can be made to a medial surface and the lateral surface with the still more nearly same grinding stone 9 in the state of the same chucking like the case where the fixed scrolling 1 describes above, by this, a scrolling compressor with high effectiveness is realizable. Moreover, although grinding process finishing of at least at least one side of the side face one b1 on which the fixed scrolling 1 and the turning scrolling 2 slide mutually, and 2b2, and one side of one b2 and 2b1 is carried out, since the grinding process of the medial surface and lateral surface of lap 1b of the fixed scrolling 1 is carried out, attachment and detachment and positioning of a work piece and a grinding stone 9 are unnecessary, and working capacity improves. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0035] The axis of rotation 12 has processed it by making a grinding stone 9 into a travelling direction X side at the position in which it inclines forward a little, by the example shown in drawing 13 being an example of the processing approach, and carrying out grinding process finishing of the side face one b1 of lap 1b in the fixed scrolling 1, and one b2. Thereby, apical surface 9c of a grinding stone 9 can process it with few include angles theta also to the field one a1 of end plate 1a. Therefore, since apical surface 9c of a grinding stone 9 can always process the field one a1 of end plate 1a only partly during processing, blowdown of the processing coolant becomes easy through the clearance 51 in which it became intermittence processing like side peripheral surface 9b, and apical surface 9c floated from the field one a1. Therefore, since apical surface 9c of a grinding stone 9 can fully be cooled, reinforcement of a grinding stone 9 can be attained and the scrolling compressor of low cost can be offered. Such a description can be said not only about the grinding stone 9 but about a revolution grinding tool and a revolution cutting tool. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0036] It is an example of the processing approach, and in finish-machining by the side face one b1 of lap 1b in the fixed scrolling 1, and the grinding process of one b2, the example shown in drawing 14 forms the coolant hole 52 in the core of a grinding stone 9, pressurizes and lets the processing coolant 53 flow, and it is processing it, gushing the processing coolant 53 from apical surface 9c of a grinding stone 9. Especially in the processing approach like the example which can extend a tool life since the processing coolant 53 is fully supplied to apical surface 9c of a grinding stone 9 and it can fully cool by this, and is shown in drawing 13, it is effective. Moreover, since the precision of lap 1b in case tool precision is imprinted is stabilized, a scrolling compressor with it is realizable. [high effectiveness and] [cheap] In addition, also in the case of turning scrolling 2, it is the same although the case of the fixed scrolling 1 was explained.

[0037]

[Effect of the Invention] According to this invention, the wave of the longitudinal direction by the grinding process is not made on the side face of a lap, or it is small, and since the front face by grinding is fine, it can prevent that compressed gas is revealed between the side faces on which each lap of fixed scrolling and turning scrolling slides mutually, and its compression efficiency improves, so that clearly from the above-mentioned explanation. And since circular orbit motion is performed without turning scrolling carrying out a very small oscillation during operation according to the wave of the hoop direction of a lap side face being small, and a front face being smooth, an operation sound can realize a quieter scrolling compressor compared with the former.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the scrolling compressor used for refrigeration, an air conditioner, etc., and the processing approach of scrolling.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] As this kind of compressor is shown mainly in drawing 16 and drawing 17, the lap a of the letter of scrolling The fixed scrolling c from which b started at the right angle from end plates c1 and d1 mostly, and the turning scrolling d Those laps a b -- it carries out what, it engages and compression space e is formed mutually, moving to the center section which leads to Delivery g from the periphery side on which compression space e leads to the inhalation opening f by circular orbit motion of the turning scrolling d, the volume is reduced, it goes and inhalation of a fluid, compression, and the regurgitation are performed.

[0003] In the scrolling compressor of air-conditioning equipment, the thing of closed mold which held the scrolling compressor in the well-closed container which is not illustrated with the motor which drives the turning scrolling d is also used about what was maintenance-free-ized in consideration of lubricity etc. thus, MMETENANSU -- about ten years need to be functional guaranteed especially of a free scrolling compressor.

[0004] By the way, after such fixed scrolling and turning scrolling carrying out casting etc. with an iron system or an aluminum system metallic material and forming them conventionally, they finish-machine the side face on which each lap slides mutually in cutting by the end mill h with the end cutting edge of 2-10 sheets, and it is made to have the required engine performance secured.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, the wave of the longitudinal direction by the grinding process is not made on the side face of a lap, or it is small, and since the front face by grinding is fine, it can prevent that compressed gas is revealed between the side faces on which each lap of fixed scrolling and turning scrolling slides mutually, and its compression efficiency improves, so that clearly from the above-mentioned explanation. And since circular orbit motion is performed without turning scrolling carrying out a very small oscillation during operation according to the wave of the hoop direction of a lap side face being small, and a front face being smooth, an operation sound can realize a quieter scrolling compressor compared with the former.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the precision of the lap side attachment wall in cut finish-machining by the end mill of the above-mentioned conventional lap is difficult to be stabilized, and to secure and manage a good precision not only depending on the process tolerance of an end mill but depending on the deflection and processing conditions by the installation error of an end mill, and is coarse. [of surface roughness] It is necessary to raise the precision of a side face to prevent [after fixed scrolling and turning scrolling have bit and been put together, make the clearance between side faces small, and] the leakage of compressed gas.

[0006] Moreover, since it is large in surface roughness since it is that to which cutting also of the end plate is carried out by the end mill with side-face processing of a lap, and **** of the head configuration of the crest in surface roughness is sharp, sliding loss and the leakage loss of compressed gas occur, and there is a problem of the effectiveness of a compressor not being enough still and being easy to get worse with time.

[0007] Furthermore, the rotational frequency of an end mill cannot but make [many] the feed per revolution per one revolution to it being common to be 20,000 or less revolutions and to process it, considering the field of processing efficiency, in order to suppress wear of the edge of a blade. The problem that where of it is generated in the pitch which the periodic processing unevenness by the part with the end cutting edge of an end mill and the part which is not cut, and is proportional to the little of the number of cutting edges when done in this way, also produce the periodic deflection by the installation error of an end mill, and these become the cause which the wave of a longitudinal direction generates on the side face of a lap, a very small oscillation occurs in turning scrolling, and the noise becomes high during scrolling compressor operation is.

[0008] Moreover, since the space formed in the meantime since it is necessary to take large beveling of the inside and outside corner section of the partner lap up end face which bit and was put together in order for the corner configuration of the boundary section of a lap side face and an end plate side to change with wear of the head outer corner section of an end mill also becomes large, therefore leakage of compressed gas increases, the technical problem that the effectiveness of a scrolling compressor gets worse occurs.

[0009] The object of this invention is to solve the above-mentioned conventional technical problem, and is to offer the processing approach of the scrolling lap used for a scrolling compressor and this with the high letter lap of scrolling of process tolerance.

[Translation done.]

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object, the typical scrolling compressor of this invention Engage the laps of the letter of scrolling which start from each end plate of fixed scrolling and turning scrolling, and compression space is formed mutually. In what reduces the volume, goes and performs inhalation of a fluid, compression, and the regurgitation while moving to the center section which leads to a delivery from the periphery side on which compression space leads to inhalation opening by circular orbit motion of turning scrolling It is characterized by finishing the side face of the lap of the letter of scrolling on which said each lap slides mutually in which one of side faces is grinding process sides at least, by the grinding process. Since the familiarity nature to the front face of a work is good even if there are not a place with a cutting edge like [in the case of an end mill] and uniform periodic processing unevenness and there is an inclination of an installation precision top some Even if the wave of the longitudinal direction by the grinding process is not made on the side face of a lap or it can do, it is small, and since the front face by grinding is fine, it can prevent that compressed gas is revealed between the side faces on which each lap of fixed scrolling and turning scrolling slides mutually, and its compression efficiency improves. And since circular orbit motion is performed without turning scrolling carrying out a very small oscillation during operation according to the wave of the hoop direction of a lap side face being small, and a front face being smooth, an operation sound can realize a quieter scrolling compressor compared with the former.

[0011] As the processing approach of the typical scrolling lap of this invention The lap of the letter of scrolling which starts from the end plate of fixed scrolling which constitutes a scrolling compressor, and turning scrolling, It is characterized by the thing which slide on each other and which is done for the grinding process of one of the side faces with the grinding stone of die length with a larger dimension than the standup height from the end plate of a lap at least. Since the time and effort and time amount which perform processing in several steps since it can attach throughout the standup height of the side face of a lap, the longitudinal direction can be covered and the grinding process can be carried out at once are not needed, working capacity is good, product cost decreases, and there is an advantage which is easy to secure process tolerance.

[0012] The object and the description beyond it of this invention become clear by the following detailed explanation and the publication of a drawing. Each description of this invention is independent [its], or can be compounded and used in various combination in the possible range.

[0013]

[Embodiment of the Invention] It explains to a detail about the processing approach of the scrolling compressor applied to the gestalt of this operation of this invention below, and a scrolling lap, referring to drawing 1 - drawing 15 with those examples, and an understanding of this invention is presented.

[0014] The gestalt of this operation as drawing 1 and drawing 15 show one example Lap 1b of the letter of scrolling which starts from each end plates 1a and 2a of the fixed scrolling 1 and the turning scrolling 2, 2bs are engaged and compression space 3 is formed mutually, and moving to the center section which leads to a delivery 5 from the periphery side on which compression space 3 leads to the inhalation opening 4 by circular orbit motion of the turning scrolling 2, the volume is reduced and it goes. Inhalation of a fluid, It is the scrolling compressor 6 which performs compression and the regurgitation, and is an example at the time of considering as the maintenance free thing for air conditioning held with the motor 8 which drives the turning scrolling 2 in the well-closed container 7 shown in drawing 15 . Therefore, the fluid which performs inhalation, compression, and the regurgitation is a refrigerant. However, if this invention engages fixed scrolling and turning scrolling with the lap of the letter of scrolling, and forms compression space and circular orbit motion of turning scrolling performs inhalation of a fluid, compression, and the regurgitation, without being restricted to this, it is effective, and especially the class of fluid to deal with is not asked, either.

[0015] Stator 8a of a motor 8 is fixed to the inner circumference of a well-closed container 7, and the scrolling

compressor 6 shown in drawing 15 is being fixed to the crankshaft 16 with which rotator 8b of the motor 8 corresponding to this drives the turning scrolling 2. Bearing of the crankshaft 16 is carried out so that it can rotate by the main bearing member 18 and the countershaft receiving part material 20 which were fixed to the inner circumference of a well-closed container 7. The thing of one-point support by things, such as a type, may be used for a type different every length every [which this example shows] width. The lower part of a well-closed container 7 serves as the lubrication sump 17.

[0016] The Oldham splice 19 to which the fixed scrolling 1 of the scrolling compressor 6 carries out a bolt stop etc., is attached in the main bearing member 18, prevents rotation of the turning scrolling 2 between the turning scrolling 2 and the main bearing members 18 which gear with this fixed scrolling 1, and a circular movement, i.e., circular orbit motion, is carried out is formed. The fixed pivot 25 prepared in the tooth back of the turning scrolling 2 for turning actuation is inserted in the eccentric bearing 26 of a way among journal shaft 16a formed in the end of a crankshaft 16, and circular orbit motion of the turning scrolling 2 is carried out through the eccentric bearing 26 and a fixed pivot 25 according to the revolution of journal shaft 16a in case a crankshaft 16 rotates. The oiling device 27 is formed in the edge of a crankshaft 16 at the countershaft receiving part material 20, and the oil suction-tube 27a is absorbed in the lubrication sump 17.

[0017] On the other hand, the conveyance-of-oil way 28 is formed in the crankshaft 16, and the lubricating oil of the lubrication sump 17 is absorbed from oil suction-tube 27a by actuation by the crankshaft 16 of the oiling device 27, after it carries out the lubrication of each sliding section of the scrolling compressor 6 through the conveyance-of-oil way 28, it is discharged in a well-closed container 7, and it returns to oil suction-tube 27a through the clearance between a motor 8 and a well-closed container 7. Moreover, the refrigerant which the scrolling compressor 6 inhaled from the suction pipe 29 is breathed out out of a well-closed container 7 through the discharge tube 30 which compressed by compression space 3 and was formed in the well-closed container 7 through the delivery 5.

[0018] The side face one b1 on which each lap 1b and 2b slide mutually, and 2b2 at least especially the scrolling compressor 6 of the gestalt of this operation on the other hand And it is used at least as a grinding process side of a side face one b2 and 2b1 where the grinding process of the side face one b1 of lap 1b of the fixed scrolling 1 and one b2 was carried out to (a) of drawing 2, and drawing 3 on the other hand with the grinding stone 9 shown as one example. Therefore, if grinding process finishing is carried out, it will be sufficient and especially the processing process before it will not be asked. After carrying out cutting of what carried out casting etc. with metallic materials, such as iron and aluminum, and gave the basic configuration, a grinding process may be carried out with a grinding stone 9 etc., you may finish, and cutting can also be omitted.

[0019] Thus, if the side face one b1 on which lap 1b of the letter of scrolling and 2b slide mutually, and 2b2 reach on the other hand at least and at least one side of one b2 and 2b1 finishes by the grinding process As it represents with the side face one b1 of lap 1b of the fixed scrolling 1, and one b2 in (b) of drawing 2 and is shown in it or there is no wave of a longitudinal direction -- being certain -- even if -- a wave which is a case [not carrying out grinding process finishing but having processed / which represents with side-face 2b1 of the turning scrolling 2, and 2b2, and is shown / it into (b) of drawing 2 with the end mill] -- comparing -- **** -- it is small. In the grinding process by the end mill, even if this does not have a place with a cutting edge, and uniform periodic processing unevenness and has the inclination of an installation precision top some, since the familiarity nature to the front face of a work is good, it is because the wave of the longitudinal direction by the grinding process is not made on the side face which carried out the grinding process. Since the front face by grinding is fine, moreover, between between the side face one b1 on which each lap 1b of the fixed scrolling 1 and the turning scrolling 2 and 2b slide mutually, and 2b2 and a side face one b2, and 2b1 If the grinding process of each one side is carried out, as shown in (b) of drawing 2, since the clearance which it starts and compressed gas reveals throughout the sliding section of a direction is not generated, both lap 1b and 2bs can prevent leakage of such compressed gas, and its compression efficiency will improve. And there is no wave of the hoop direction of the side face as for which lap 1b and 2b carried out the grinding process, or it is small, and since circular orbit motion is performed without turning scrolling carrying out a very small oscillation during operation according to a front face being smooth, an operation sound can realize a quieter scrolling compressor compared with the former. Moreover, wear is also reduced. As opposed to the surface roughness in the case of being based on end mill processing, as shown in (b) of drawing 4 being 2 micrometers The surface roughness at the time of carrying out grinding process finishing, as shown in (a) of drawing 4 is halved with 1 micrometer. Rather than the crest 21 of the surface roughness in the case of being based on end mill processing, it is small, and the possibility of the wear on the basis of the local dissolution by generation of heat which takes place by contact of crests is almost canceled, the direction of the crest 22 of the surface roughness in the case of being based on a grinding process sharpens, and abrasion resistance of whenever improves [a sliding friction is small and]. According to similarly it being shallower

than trough 21a in case trough 22a of surface roughness is end mill processing, since leakage of compressed gas can be suppressed more, a reliable scrolling compressor can be offered.

[0020] Therefore, it is convenient although the functional guarantee over the long period of time of ten years in the scrolling compressor of the closed mold shown in maintenance free drawing 15 is offered. It is more suitable for the improvement in the engine performance by the above grinding processes to make into a grinding process side the both sides of the both sides of the side face one b1 on which it slides mutually, and 2b2 and a side face one b2, and 2b1.

[0021] As the grinding process approach of such lap 1b of the letter of scrolling, and 2b It uses as a revolution grinding tool by carrying out chucking of the grinding stone 9 at the head of the processing shaft 11 by which a revolution and migration are controlled as one example is shown in drawing 2. With the position in which the axis of rotation 12 of a grinding stone 9 becomes in parallel with the medial-axis line 13 of the fixed scrolling 1 or the turning scrolling 2 What is necessary is just to process grinding by the grinding stone 9, when reliance makes it move to the side face one b1 set as the grinding process object of lap 1b and 2b along with longitudinal directions, such as lap 1b, without moving from its seat as shown in drawing 1. However, the concrete approach of whether what we do with a grinding process can be chosen freely. However, it is suitable to hold down to 1 micrometer or less, when harnessing the advantage by the above grinding processes as surface roughness by the grinding process.

[0022] Moreover, in (a) of drawing 2, and drawing 3, in case the grinding process of the side face one b1 of lap 1b of the fixed scrolling 1, one b2, etc. is carried out, it is suitable to be 30,000 or more revolutions per for 1 minute, and to process the rotational frequency of a grinding stone 9. Thereby, although the amounts of processings per revolution are few, since the rotational frequency is high, the amount of processings per unit time amount can secure the conventional end mill and more than equivalent. Furthermore, since the amount of processings per revolution of a grinding stone 9 can be small stopped compared with an end mill, the wave of the grinding side face one b1 generated by the deflection of the grinding stone 9 as a revolution grinding tool and the lap longitudinal direction of one b2 can be made small, the minute oscillation of the turning scrolling 2 under operation is controlled, and the scrolling compressor of the low noise can be realized.

[0023] Like the example shown at (a) of drawing 2, and drawing 3 although a grinding process is carried out, as a grinding stone 9 If a thing with bigger linear dimension L than standup height H of lap 1b which carries out the grinding process of the side face, and 2b is adopted, since reliance will obtain a grinding stone 9 at once in all the range of standup height H of lap 1b and 2b The rest can finish-machine at once the scrolling configuration of the side face set as the object of a grinding process, if moved to the longitudinal direction of lap 1b which carries out a grinding process, and 2b. Therefore, time and effort and adjustment which divide into multiple times and perform a grinding process become unnecessary, although process tolerance is high, compaction of floor to floor time is achieved, and the cheap scrolling compressor of cost can be offered.

[0024] Moreover, on the occasion of such processing, a grinding stone 9 [that finish-machining actuation in which it does not move in the direction of axis of rotation 12 is performed, etc. and] Microscopic irregularity as shown in (c) of drawing 2 which right-angled lap 1b and 2b start to end plates 1a and 2a, and is made in a direction The longitudinal direction of lap 1b which met in the direction of relative displacement with side faces, such as lap 1b by which the grinding process was carried out by this to the grinding stone 9, and 2b, and 2b is followed. The processing marks 31 will be formed. The processing marks 31 of such a direction Lap 1b, The wave of the lap longitudinal direction in the side face as for which 2b carried out the grinding process can be stopped very small. It can circle that is, circular orbit exercise, without also causing a minute oscillation between the fixed scrolling 1, and the turning scrolling 2 can offer the scrolling compressor of the low noise more.

[0025] In many cases, such processing marks 31 are obtained as what the configuration of the direction of the axis of rotation 12 in the side peripheral surface of a grinding stone 9 imprinted, but if configuration attachment by the dressing of the side peripheral surface of a grinding stone 9 is performed, the processing marks 31 can be formed in a satisfactory configuration. Although a grinding process side is not asked about the processing method of a substrate in order to enable it to fully demonstrate the description by such grinding process, it is necessary to set up the finishing stock only by the grinding process in which the effect of the condition of a substrate side does not remain. Moreover, although it is suitable for the set-up finishing stock that it is satisfied with one grinding process as mentioned above, it is desirable to set grinding finishing-stock S or less to 1/10 to the particle size of the abrasive grain 91 of a grinding stone 9 as one example is typically shown in drawing 5. Thus, even when are set up and an abrasive grain 91 is fixed to a base material 92 with adhesives 93 as shown in drawing 5, the chip pocket 32 of scraps blowdown can fully secure, scraps can discharge smoothly, the burden concerning a grinding stone 9 is mitigated and a life becomes long that it is easy to prevent omission of an abrasive grain 91. The cost of a scrolling compressor reduces only the part.

[0026] Moreover, the example typically shown in drawing 6 is an example of a scrolling compressor, and is an example

at the time of processing it so that the side face one b1 of the fixed scrolling 1 as for which is [the side face] periodical or carries out configuration management with a dressing as occasion demands etc., and it carries out a grinding process, one b2, etc. may start and the side periphery configuration of a grinding stone 9 may be imprinted as a configuration of the right-angled sense to direction, i.e., end plate, 1a. If it does in this way, by configuration management of a grinding stone 9, to end plate 1a of side faces, such as lap 1b of the fixed scrolling 1 which carries out a grinding process, it can be right-angled, that is, the configuration of the direction of the medial-axis line 13 can be managed. By this, it is stabilized easily, the optimal configuration in the condition that heat and a pressure were added can be formed at the time of operation, leakage of the compressed gas under operation can decrease, and the high scrolling compressor of effectiveness can be offered.

[0027] But cutting other than the grinding process according [the above processing marks 31] to a grinding stone 9 is also attained, and the effectiveness which can make small the wave of the longitudinal direction of lap 1b and 2b according to the condition of the processing marks 31 is demonstrated irrespective of the difference in the processing approach.

[0028] The example shown in drawing 7 is an example of the processing approach, and shows the example used as the scrolling compressor 6 which formed corner section 1c of the side face one b1 of lap 1b of the fixed scrolling 1, and the boundary section of one b2 and end plate 1a on the curved surface. The inside-and-outside corner aspect picking section 33 at the head of lap 2b [in / by this / the turning scrolling 2], Since the space 34 formed by corner section 1c of the fixed scrolling 1 can be compared with the space 36 formed between corner section 2c of the turning scrolling 2 which is not a curved surface, and the inside-and-outside chamfer 35 at the head of lap 1b in the fixed scrolling 1 and can be made small several [1/] Leakage of compressed gas can realize the high scrolling compressor of little effectiveness. In addition, although this example represented and explained by the fixed scrolling 1, the turning scrolling 2 is suitable similarly.

[0029] The example shown in drawing 8 is an example of the processing approach, and forms corner section 1c in a curved surface by the imprint of the configuration of corner section 9a in a grinding stone 9 by forming outer-corner section 9a at the head of a grinding stone 9 in a curved surface, and processing the side face one b1 of lap 1b in the fixed scrolling 1, and one b2 into the field and coincidence of end plate 1a. This as well as the turning scrolling 2 is applicable. The configuration when making corner section 1c and 2c of the fixed scrolling 1 or the turning scrolling 2 into a curved surface by this by managing the curved-surface configuration in corner section 9a at the head of a grinding stone 9 with a dressing etc. is manageable. Here, compared with the direct configuration management in corner section 1c and 2c of the fixed scrolling 1 or the turning scrolling 2, since it is easy also on a facility, whenever it processes management of the curved-surface configuration of corner section 9a in grinding stone 9 head, it can be checked, and it can supply the high components of quality. This is very important when maintaining small the space 34 and 36 formed between the corner sections 1c and 2c in the fixed scrolling 1 or the turning scrolling 2, and the chamfers 33 and 35 at the head of partner lap 1b or 2b, and it can realize the high scrolling compressor of effectiveness easily.

[0030] The fixed scrolling 1 which the example shown in drawing 9 is an example of the processing approach, and serves as a grinding object with chucking equipment 41 On the chucking table 42, carry out chucking by the chucking member 43, fix from two places, the surroundings, at least, and cutting only of the cut cost is carried out with an end mill 44 in this condition. After considering as a uniform predetermined cutting side from the condition of the substrate by casting etc., the grinding process by the grinding stone 9 is performed with the chucking condition at the time of processing by the end mill 44, without removing from said chucking equipment 41.

[0031] Since the remainder of the processing side 45 can be lost before being the substrate which carried out cutting with the end mill 44, even if it makes it by this small to about [in the grinding process by the grinding stone 9] finishing-stock S0.01mm, the high components of quality can be obtained. Since especially lap 1b has usually adopted complicated configurations, such as an involute, in many cases, once it separates from chucking equipment 41 before a finish-machining process, a main gap and an include-angle gap will arise, if finishing-stock S is made smaller than about 0.05mm, the front processing side 45 will remain and it will become poor quality. Moreover, since a grinding process is carried out without removing from chucking equipment 41, since finishing-stock S becomes homogeneity and the load to a grinding stone 9 is stabilized, process tolerance is stabilized, and since it is minute, the load to a grinding stone 9 becomes small, and finishing-stock S can lengthen the life of a grinding stone 9. Therefore, it is quality and the product of low cost can be supplied. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0032] The example shown in drawing 10 is an example of the processing approach, with the grinding stone 9, is carrying out the grinding process of the field of the side face one b1 of lap 1b in the fixed scrolling 1, one b2, and end

plate 1a simultaneously, and is finish-machining it. Thereby, since corner section 1c made to the side face one b1 of lap 1b and the boundary section between one b2 and end plate 1a is formed in a minute curved surface, it can raise the reinforcement of lap 1b. Therefore, a reliable scrolling compressor can be offered. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0033] The example shown in drawing 11 is an example of the processing approach, and as a continuous line and an imaginary line show, it is carrying out grinding finish-machining of the side face one b1 of lap 1b and the field one a1 of one b2 and end plate 1a in the fixed scrolling 1 at the separate process with the same grinding stone 9. Thereby, since the processing side of a grinding stone 9 is divided into two processing sides which process it into different ** of side peripheral surface 9b for lap 1b, and near apical surface 9c of end plate 1a, though it is processing of the 2nd page by one grinding stone 9, reinforcement of a grinding stone 9 can be attained that generation of heat at the time of processing is hard to be accumulated. Of course, even if it processes it independently with each exclusive grinding stone the object for processing of lap 1b, and for processing of end plate 1a, there is same effectiveness. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0034] The example shown in drawing 12 is an example of the processing approach, and although grinding process finishing of the lap 1b in the fixed scrolling 1 is carried out, as a continuous line showed first, it processed it in advance per inside side face one b1, and as an imaginary line shows after that, it is processed into it with the same grinding stone 9 per outside side face one b2. Since the respectively optimal scrolling configuration can be made to a medial surface and the lateral surface with the still more nearly same grinding stone 9 in the state of the same chucking like the case where the fixed scrolling 1 describes above, by this, a scrolling compressor with high effectiveness is realizable. Moreover, although grinding process finishing of at least at least one side of the side face one b1 on which the fixed scrolling 1 and the turning scrolling 2 slide mutually, and 2b2, and one side of one b2 and 2b1 is carried out, since the grinding process of the medial surface and lateral surface of lap 1b of the fixed scrolling 1 is carried out, attachment and detachment and positioning of a work piece and a grinding stone 9 are unnecessary, and working capacity improves. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0035] The axis of rotation 12 has processed it by making a grinding stone 9 into a travelling direction X side at the position in which it inclines forward a little, by the example shown in drawing 13 being an example of the processing approach, and carrying out grinding process finishing of the side face one b1 of lap 1b in the fixed scrolling 1, and one b2. Thereby, apical surface 9c of a grinding stone 9 can process it with few include angles theta also to the field one a1 of end plate 1a. Therefore, since apical surface 9c of a grinding stone 9 can always process the field one a1 of end plate 1a only partly during processing, blowdown of the processing coolant becomes easy through the clearance 51 in which it became intermittence processing like side peripheral surface 9b, and apical surface 9c floated from the field one a1. Therefore, since apical surface 9c of a grinding stone 9 can fully be cooled, reinforcement of a grinding stone 9 can be attained and the scrolling compressor of low cost can be offered. Such a description can be said not only about the grinding stone 9 but about a revolution grinding tool and a revolution cutting tool. In addition, although the fixed scrolling 1 explained in this example, the same is said of the turning scrolling 2.

[0036] It is an example of the processing approach, and in finish-machining by the side face one b1 of lap 1b in the fixed scrolling 1, and the grinding process of one b2, the example shown in drawing 14 forms the coolant hole 52 in the core of a grinding stone 9, pressurizes and lets the processing coolant 53 flow, and it is processing it, gushing the processing coolant 53 from apical surface 9c of a grinding stone 9. Especially in the processing approach like the example which can extend a tool life since the processing coolant 53 is fully supplied to apical surface 9c of a grinding stone 9 and it can fully cool by this, and is shown in drawing 13, it is effective. Moreover, since the precision of lap 1b in case tool precision is imprinted is stabilized, a scrolling compressor with it is realizable. [high effectiveness and] [cheap] In addition, also in the case of turning scrolling 2, it is the same although the case of the fixed scrolling 1 was explained.

[Translation done.]

* NOTICES *

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2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view of an important section showing one example of the scrolling compressor concerning the gestalt of operation of this invention.

[Drawing 2] It is the perspective view showing the condition of the sectional view in which the (a) shows the processing approach, the sectional view showing the condition of the existence of a wave [in / in the (b) / a lap longitudinal direction], and the processing marks to which the (c) follows a lap longitudinal direction by showing the example and processing condition of the processing approach of fixed scrolling in the compressor shown in drawing 1 .

[Drawing 3] Type section drawing showing the example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 4] It is the mimetic diagram showing surface roughness in case surface roughness in case the (a) is based on the grinding process shown in (a) of drawing 2 and drawing 3 , and its (b) are based on end mill processing by showing the difference in the surface roughness of a grinding process and the grinding process by the end mill.

[Drawing 5] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 6] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 7] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 8] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 9] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 10] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 11] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 12] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 13] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 14] Type section drawing showing one example of the processing approach of fixed scrolling in the compressor shown in (a) of drawing 2 .

[Drawing 15] The sectional view showing the whole one example configuration of a scrolling compressor used as closed mold.

[Drawing 16] The cross-sectional view showing a conventional scrolling compressor and its conventional processing approach.

[Drawing 17] Drawing of longitudinal section of the compressor of drawing 16 .

[Description of Notations]

1 Fixed Scrolling

2 Turning Scrolling

1a, 2a End plate

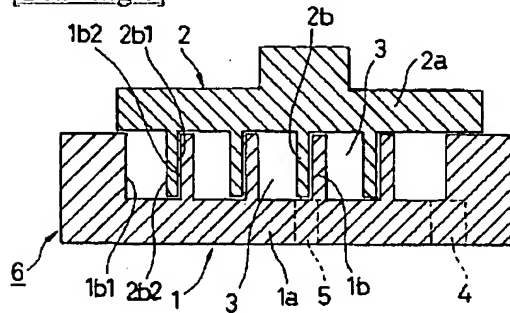
One a1, two a1 Field of an end plate
1b, 2b Lap
One b1, one b2, 2b1, 2b2 Side face
1c, 2c Corner section
3 Compression Space
4 Inhalation Opening
5 Delivery
6 Scrolling Compressor
9 Grinding Stone
9a Corner section
9b Side peripheral surface
9c Apical surface
12 Axis of Rotation
13 Medial-Axis Line
31 Processing Marks
41 Chucking Equipment
44 End Mill
53 Processing Coolant
S Finishing stock

[Translation done.]

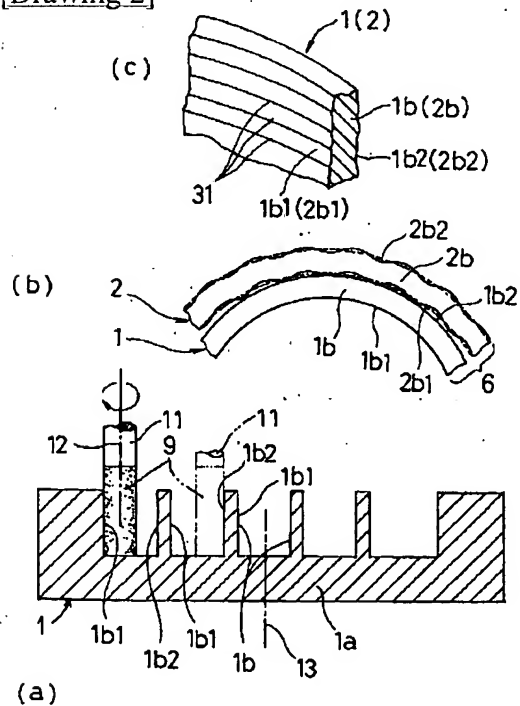
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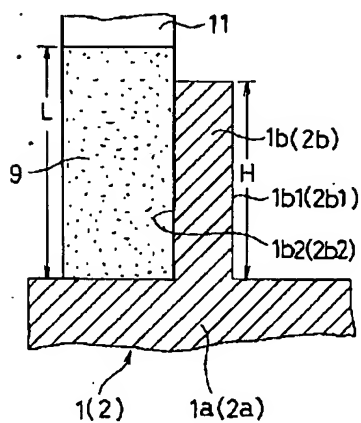
[Drawing 1]



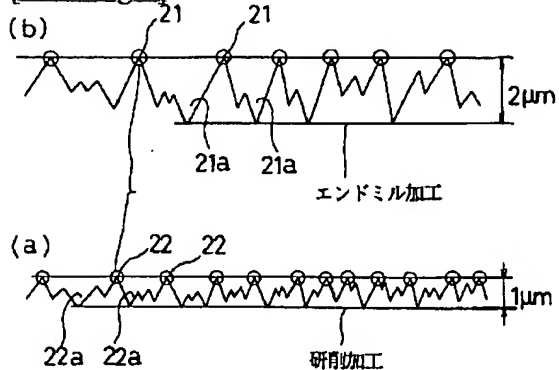
[Drawing 2]



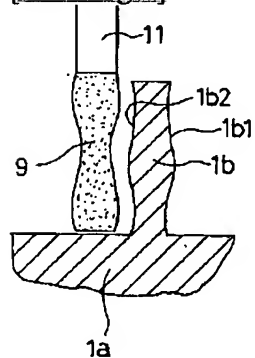
[Drawing 3]



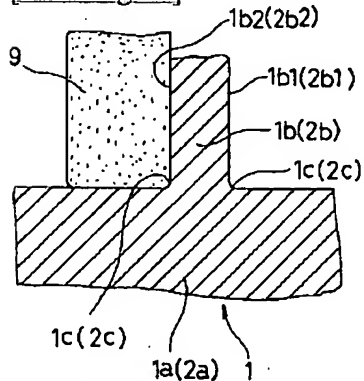
[Drawing 4]



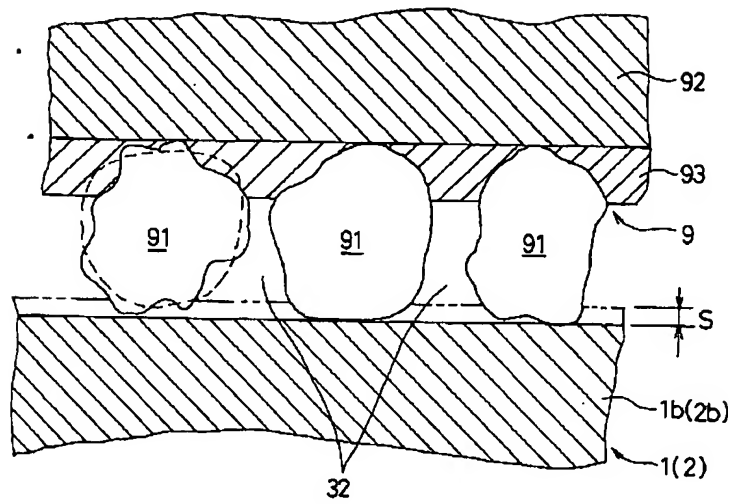
[Drawing 6]



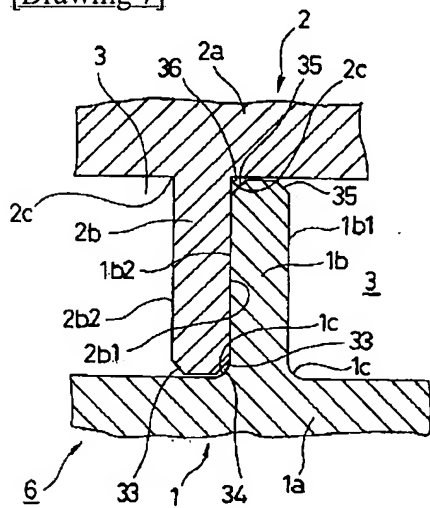
[Drawing 10]



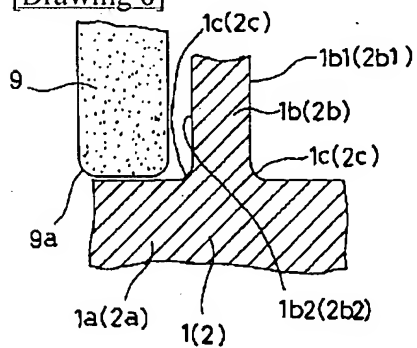
[Drawing 5]



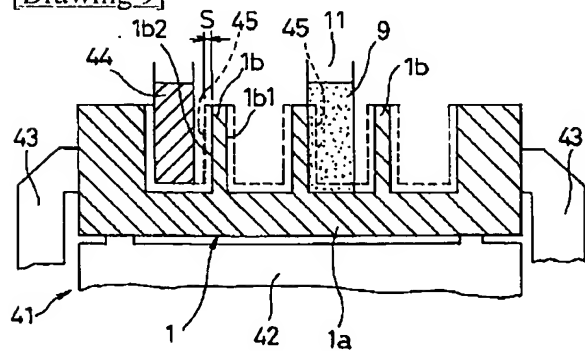
[Drawing 7]



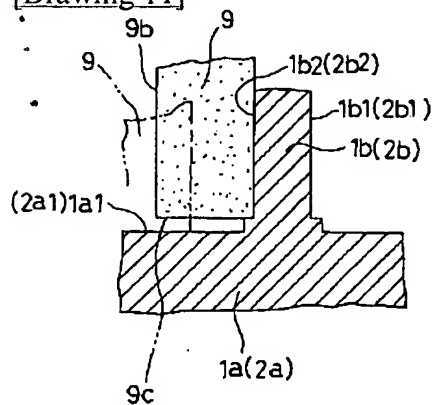
[Drawing 8]



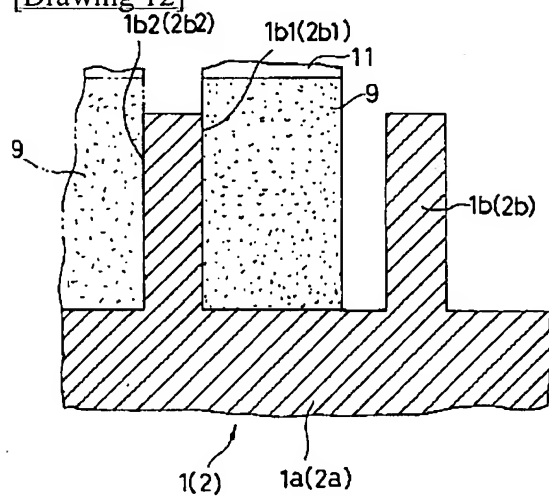
[Drawing 9]



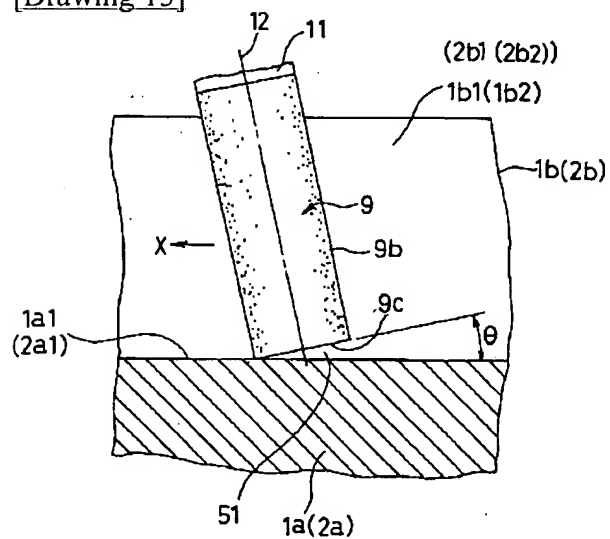
[Drawing 11]



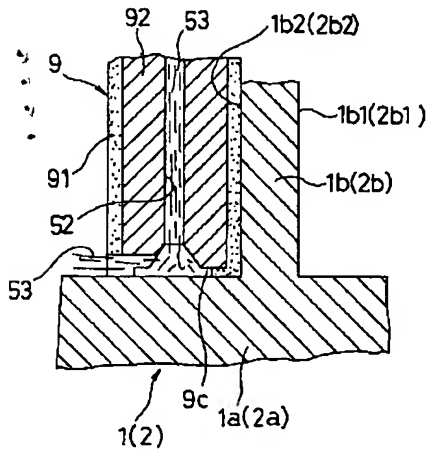
[Drawing 12]



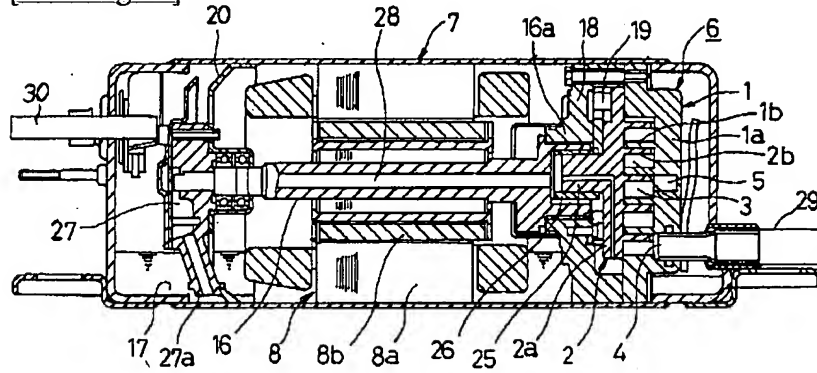
[Drawing 13]



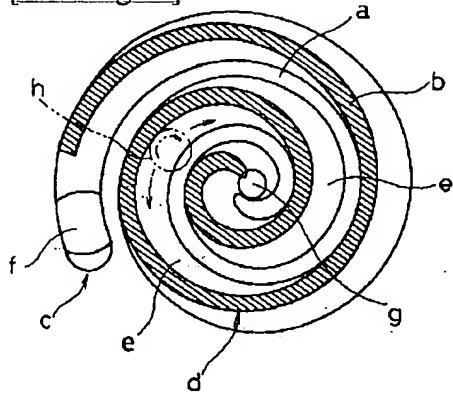
[Drawing 14]



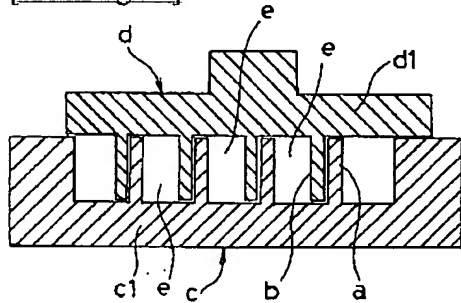
[Drawing 15]



[Drawing 16]



[Drawing 17]



[Translation done.]